CHAPTER

8

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SHOP DRAWINGS

Introduction

The fabricator prepares shop drawings and erection drawings by interpreting the engineering drawings in the contract plans. The engineer who prepares the engineering drawings shall generally be responsible for checking of the corresponding shop drawings.

Scope

This article covers the responsibilities of the Engineer regarding shop drawings review. The Engineer's responsibilities include two requirements, expediency and completeness, in checking the shop drawings for conformity to contract plans, specifications and special provisions.

Commentary

An engineer charged with checking shop drawings for the first time often asks or wonders, "How complete or to what detail should the drawings be checked? The answer to this question is as variable as are the details prepared by the engineer. As the engineer gains experience in checking shop details, he acquires working knowledge of what must be checked and what may be scanned over. The remainder of this article may serve as a guide to the inexperienced checker and a reminder to the experienced engineer.

Guidelines, Shop Drawing Review

1. Always check shop drawings to the extent you are satisfied that the structure described can be fabricated and erected according to the governing plans and specifications.

2. Shop details shall have top priority unless you are otherwise instructed. This rule is needed to avoid costly delays in the bridge construction.

3. The amount of time to be spent checking shop details should be proportional to their complexity and quantity of sheets involved.

ASTM DESIGNATION	YEAR	SHAPE OR DIMENSIONS	GRADE	MINIMUM Fy
A-7	1924	-	Structural	30 ksi
A-7	1924	Rivet	Structural	25 ksi
A-7	1934	-	Structural	33 ksi
A-8	1924	Rivet	Structural	45 ksi
A-8	1924	Plates, Shapes, Bars	-	50 ksi
A-8	1924	Eyebar Flats & Rollers	Unannealed	55 ksi
A-8	1924	Eyebar Flats & Pins	Annealed	52 ksi
A-8	1938	Eyebar Flats	Unannealed	55 ksi
A-8	1938	Full Size Tested Eyebars	Annealed	48 ksi
A-15	1914	Plain & Deformed	Structural	33 ksi
A-15	1914	Plain & Deformed	Intermediate	40 ksi
A-15	1914	Plain & Deformed	Hard	50 ksi
A-15	1914	Cold Twisted	-	55 ksi
A-16	1914	Plain, Deformed, Hot-Twisted	-	50 ksi
A-16	1959T	Plain & Deformed	Normal	50 ksi
A-16	1959T	Deformed	Special	60 ksi
A-36	1960T	Plates, Shapes, Bars	Structural	36 ksi
A-94	1927	-	Structural	45 ksi
A-141	1933	Rivet	Structural	28 ksi
A-195	1939T	Rivet	Structural	38 ksi
A-242	1941T	$3/16" < t$ (thickness) $< 3/4"$	Structural	50 ksi
A-242	1941T	$3/4" < t < 1\,1/2"$	Structural	45 ksi
A-242	1941T	$1\,1/2" < t < 2"$	Structural	40 ksi
A-242	1955	$t < 3/4"$	Structural	50 ksi
A-242	1955	$3/4" < t < 1\,1/2"$	Structural	46 ksi
A-242	1955	$1\,1/2" < t < 4"$	Structural	42 ksi
A-373	1954T	Plates, Shapes, Bars	Str. Welding	32 ksi
A-406	1957T	Rivet	Structural	50 ksi

"T" denotes a tentative ASTM designation approved by the sponsoring committee.

BRIDGE STEEL

ASTM DESIGNATION	YEAR	SHAPE OR DIMENSIONS	GRADE	MINIMUM Fy
A-440	1959T	t (thickness) < 3/4"	Structural	50 ksi
A-440	1959T	3/4" < t < 1 1/2"	Structural	46 ksi
A-440	1959T	1 1/2" < t < 4"	Structural	42 ksi
A-441	1960T	t < 3/4"	Structural	50 ksi
A-441	1960T	3/4" < t < 1 1/2"	Structural	46 ksi
A-441	1960T	1 1/2" < t < 4"	Unannealed	42 ksi

"T" denotes a tentative ASTM designation approved by the sponsoring committee.

A-7 - Structural steel (discontinued, replaced by A-36, A-283 A-663, & A-675).

A-8 - Structural nickel steel (discontinued).

A-15 - Billet-steel for reinforcing bars (discontinued, replaced by A-615).

A-16 - Rail-steel for reinforcing bars (discontinued, replaced by A-616).

A-36 - Structural steel.

A-94 - Structural silicon steel (discontinued).

A-141 - Structural rivet steel (discontinued, replaced by A-502).

A-195 - High-strength structural rivet steel (discontinued, replaced by A-502).

A-242 - High-strength low-alloy structural steel.

A-373 - Structural steel for welding (discontinued, combined with A-36).

A-406 - High-strength structural alloy rivet steel (discontinued).

A-440 - High-strength structural steel (discontinued).

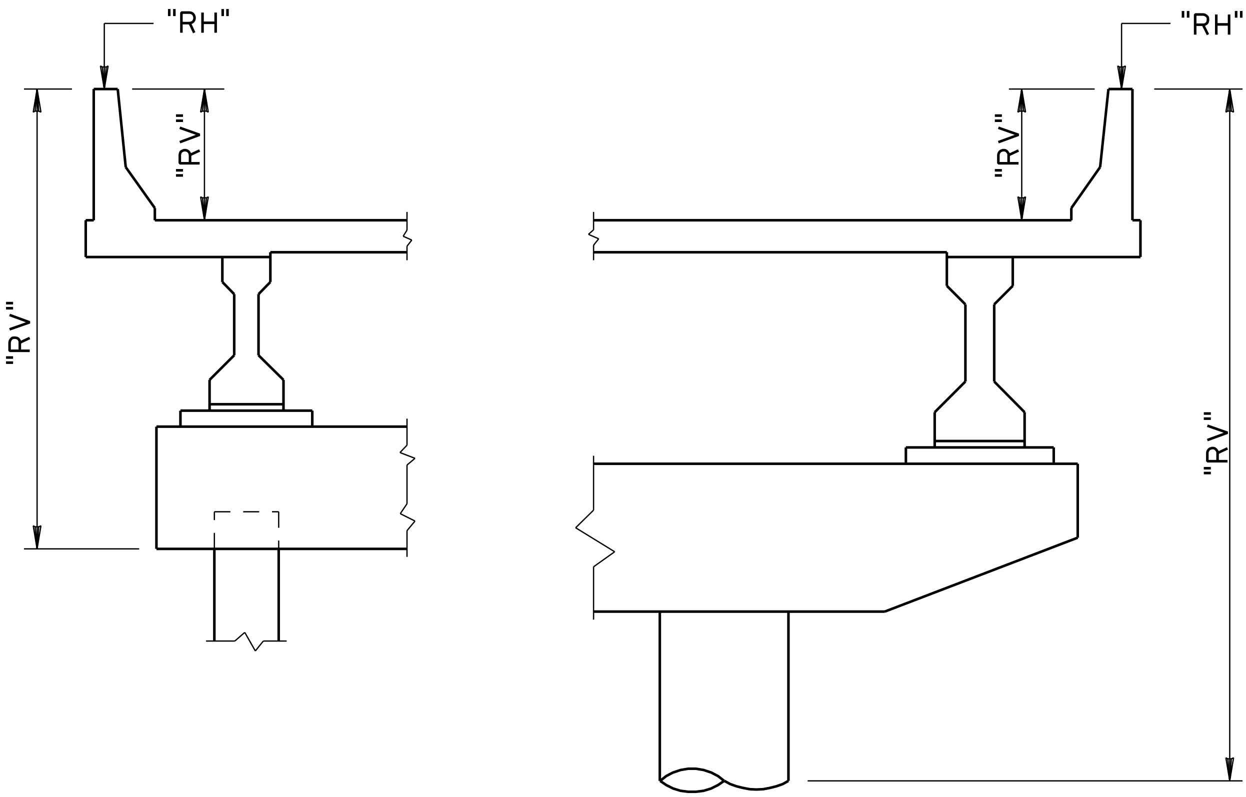
A-441 - High-strength low-alloy structural manganese vanadium steel (discontinued, replaced by A-572).

BRIDGE STEEL

Table Showing Materials Unit Weight .

The following unit weights shall be used in computing dead load and for estimating pay quantities where payment for material is to be made on the basis of weight:

MATERIAL	UNIT WEIGHT (kg/m^3)
Steel,: Rolled, cast, *copper bearing*, silicon, nickel and stainless	7850
Iron, cast	7130
Iron, malleable	7530
Iron, wrought	7800
Aluminum, cast or wrought	2770
Copper, alloy	8590
Copper, sheet	8940
Bronze, cast	8590
Lead, sheet	11320
Zinc	7210
Timber, treated	960
Timber, untreated	770
Concrete, plain or reinforced	2400
Brick, common	1920
Asphalt plank	1730
Macadam or gravel, rolled	2240
Embankment fills, rammed sand or gravel	1920
Loose sand and earth	1600
Cinder filling	960



NOTES:

"RV" denotes vertical and sloping faces and chamfers, as seen in elevation, which are to receive a class 2A special surface finish. "RH" denotes horizontal surfaces which are to receive a class 2A special surface finish.

The following surfaces shall receive a class 2A special surface finish:

1. Visually exposed faces of wingwalls, cast-in-place retaining walls, railings and parapets.
2. Outside faces of exterior concrete girders, slabs, brackets, curbs, headwalls, parapets, and vertical faces of caps and columns.

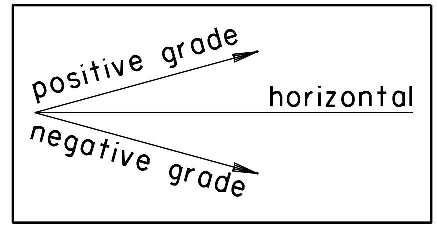
Bridge deck surfaces shall receive a class 6, Bridge Deck Finish except for sidewalks which are to receive a class 7, Sidewalk Finish. All other surfaces are to receive a class 1, Ordinary Surface Finish.

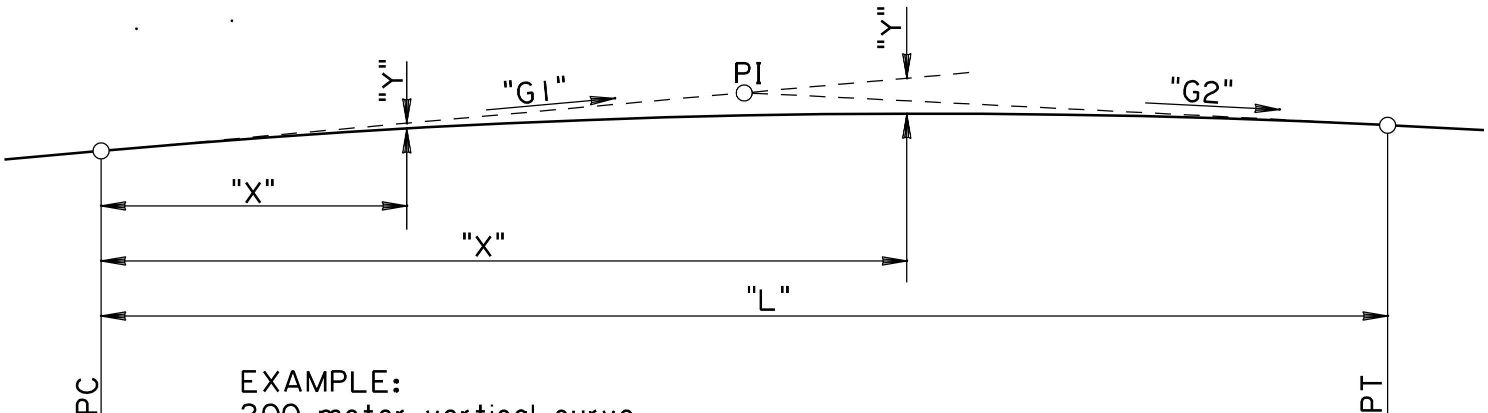
SURFACE FINISHING

Let: L = total length of vertical curve in meters
$G1$ = grade left of PI in decimals
$G2$ = grade right of PI in decimals
Y = correction for any point on curve in meters
X = distance of that point from PC in meters

Then : $Y = \frac{0.5(G2-G1)}{L}(X)^2$

Curve elev. = PC elev. + X(G1) + Y





EXAMPLE:
200 meter vertical curve
L=200 m, G1=+4.5%=+0.045, G2=-2.5%=-0.025
PC = Sta.10+000.000, Elev. 10.000 m

STATION	TANGENT ELEV.	CORRECTION	CURVE ELEV.
10+025.000	11.125	0.109 375 m	11.016
10+050.000	12.250	0.437 500 m	11.813
10+075.000	13.375	0.984 375 m	12.391
10+100.000 (PI)	14.500	1.750 000 m	12.750
10+125.000	15.625	2.734 375 m	12.891
10+150.000	16.750	3.937 500 m	12.813
10+175.000	17.875	5.359 375 m	12.516
10+200.000 (PT)	19.000	7.000 000 m	12.000

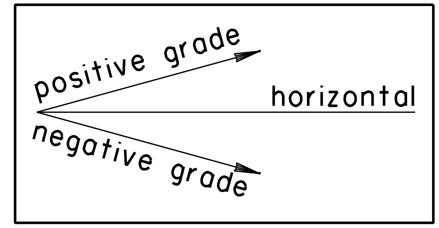
In the above example, $Y = -0.000175(X)^2$.
The negative sign implies a downward measurement from tangent G1.

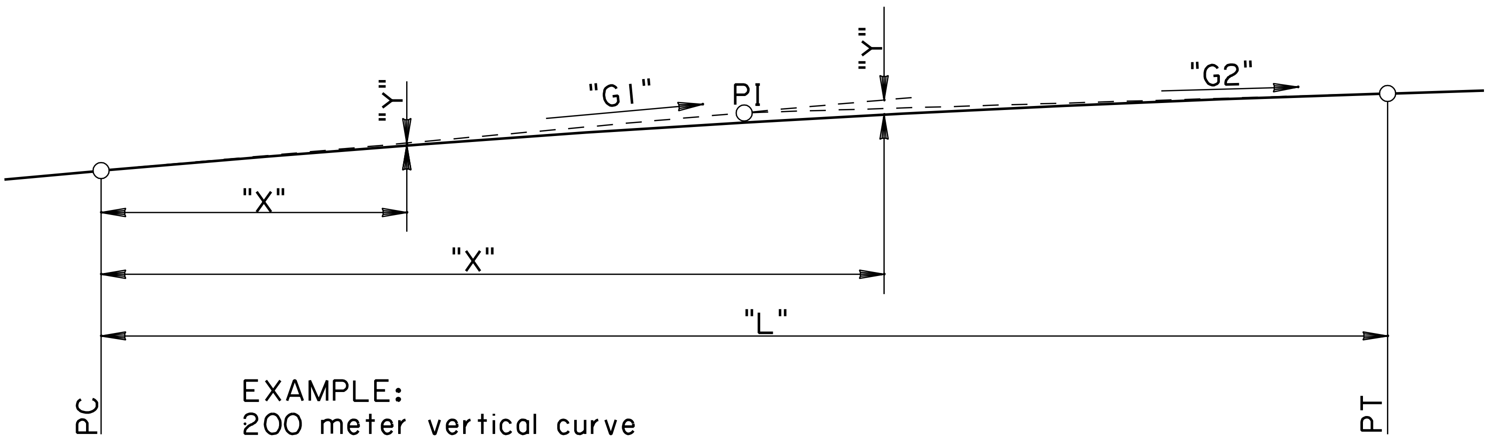
VERTICAL CURVES

Let: L = total length of vertical curve in meters
G1 = grade left of PI in decimals
G2 = grade right of PI in decimals
Y = correction for any point on curve in meters
X = distance of that point from PC in meters

Then : $Y = \frac{0.5(G2-G1)}{L}(X)^2$

Curve elev. = PC elev. + X(G1) + Y





EXAMPLE:
200 meter vertical curve
L=200 m, G1=+4.5%=+0.045, G2=+1.5%=0.015
PC = Sta.10+000.000, Elev. 10.000 m

STATION	TANGENT ELEV.	CORRECTION	CURVE ELEV.
10+025.000	11.125	0.046 875 m	11.078
10+050.000	12.250	0.187 500 m	12.063
10+075.000	13.375	0.421 875 m	12.953
10+100.000 (PI)	14.500	0.750 000 m	13.750
10+125.000	15.625	1.171 875 m	14.453
10+150.000	16.750	1.687 500 m	15.063
10+175.000	17.875	2.296 875 m	15.578
10+200.000 (PT)	19.000	3.000 000 m	16.000

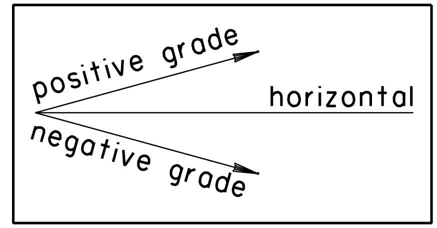
In the above example, $Y = -0.000075(X)^2$.
The negative sign implies a downward measurement from tangent G1.

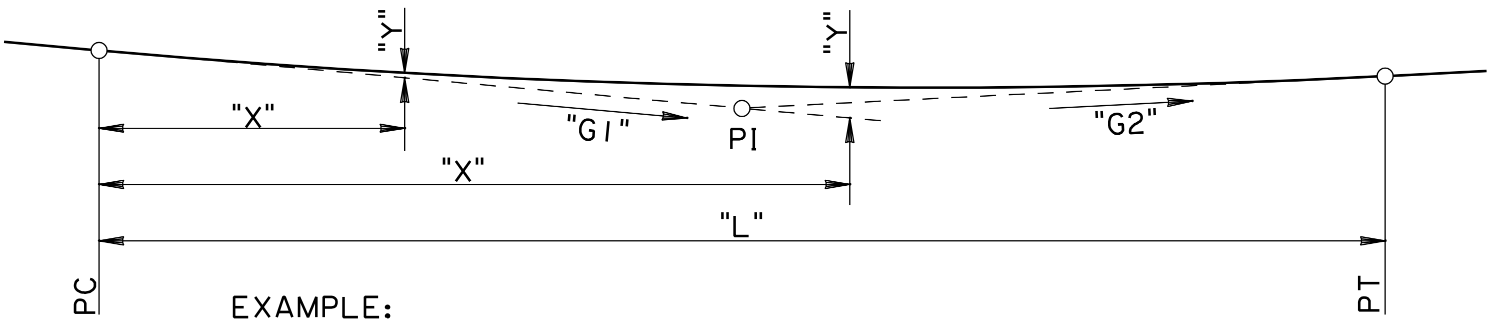
VERTICAL CURVES

Let: L = total length of vertical curve in meters
G1 = grade left of PI in decimals
G2 = grade right of PI in decimals
Y = correction for any point on curve in meters
X = distance of that point from PC in meters

Then : $Y = \frac{0.5(G2-G1)}{L}(X)^2$

Curve elev. = PC elev. + X(G1) + Y





EXAMPLE:
200 meter vertical curve
L=200 m, G1=-4.5%=-0.045, G2=+2.5%=+0.025
PC = Sta.10+000.000, Elev. 10.000 m

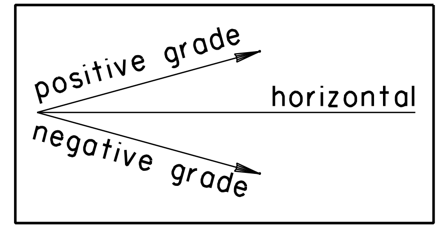
STATION	TANGENT ELEV.	CORRECTION	CURVE ELEV.
10+025.000	8.875	0.109 375 m	8.984
10+050.000	7.750	0.437 500 m	8.188
10+075.000	6.625	0.984 375 m	7.609
10+100.000 (PI)	5.500	1.750 000 m	7.250
10+125.000	4.375	2.734 375 m	7.109
10+150.000	3.250	3.937 500 m	7.188
10+175.000	2.125	5.359 375 m	7.484
10+200.000 (PT)	1.000	7.000 000 m	8.000

In the above example, $Y = +0.000175(X)^2$.
The positive sign implies an upward measurement from tangent G1.

VERTICAL CURVES

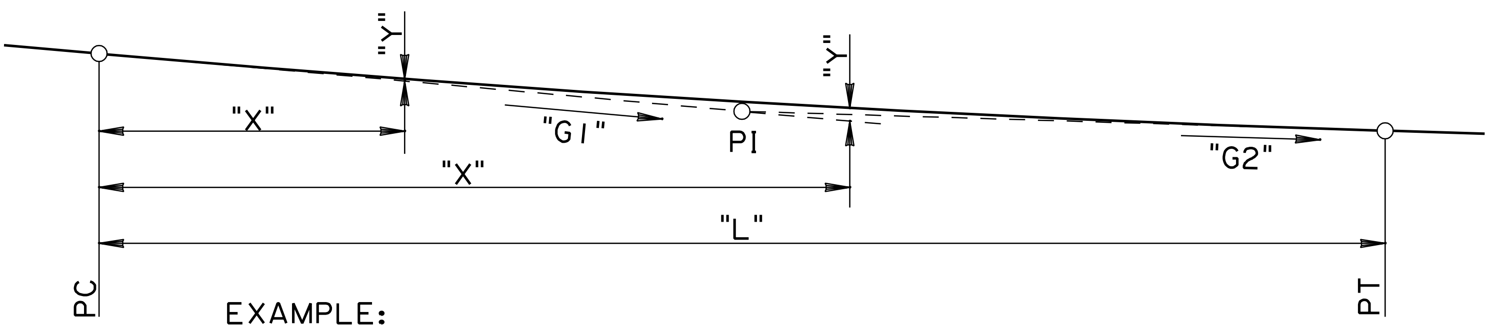
3 OF 4

Let: L = total length of vertical curve in meters
G1 = grade left of PI in decimals
G2 = grade right of PI in decimals
Y = correction for any point on curve in meters
X = distance of that point from PC in meters



Then : $Y = \frac{0.5(G2-G1)}{L}(X)^2$

Curve elev. = PC elev. + X(G1) + Y

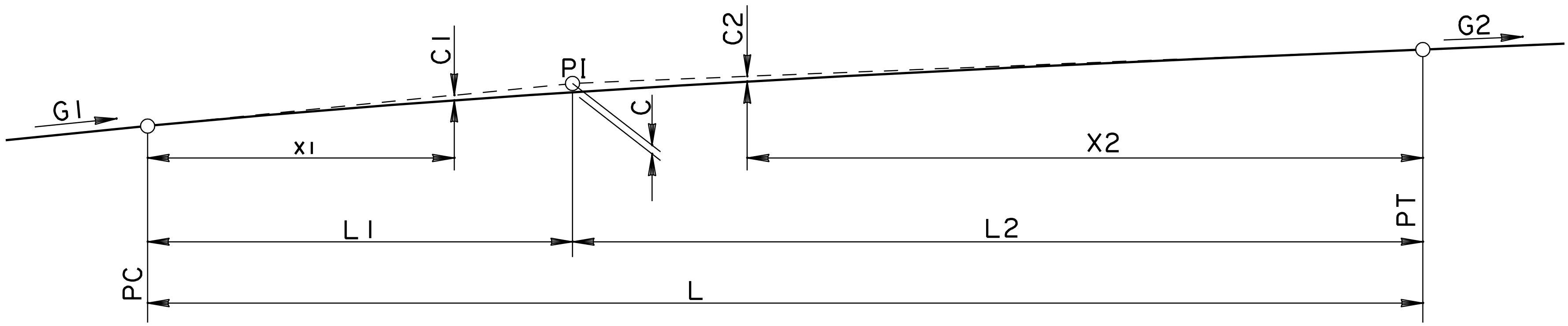


EXAMPLE:
200 meter vertical curve
L=200 m, G1=-4.5%=-0.045, G2=-1.5%=-0.015
PC = Sta.10+000.000, Elev. 10.000 m

STATION	TANGENT ELEV.	CORRECTION	CURVE ELEV.
10+025.000	8.875	0.046 875 m	8.922
10+050.000	7.750	0.187 500 m	7.938
10+075.000	6.625	0.421 875 m	7.047
10+100.000 (PI)	5.500	0.750 000 m	6.250
10+125.000	4.375	1.171 875 m	5.547
10+150.000	3.250	1.687 500 m	4.938
10+175.000	2.125	2.296 875 m	4.422
10+200.000 (PT)	1.000	3.000 000 m	4.000

In the above example, $Y = +0.000075(X)^2$.
The positive sign implies an upward measurement from tangent G1.

VERTICAL CURVES



ECCENTRIC VERTICAL CURVES

EXAMPLE

300 meter eccentric vertical curve, L1=100 m, L2=200 m
G1=+5.00%, G2=+2.00%, PI=sta.10+100, elev.=15.000 m

$$C=\frac{(100)(200)(0.02-0.05)}{2(300)}=-1.000\text{ m}$$

$$C1=\frac{(-1)(X1)^2}{(100)^2}=-0.0001(X1)^2$$

$$C2=\frac{(-1)(X2)^2}{(200)^2}=-0.000025(X2)^2$$

STATION	DISTANCE X1	DISTANCE X2	TANGENT ELEV.	CORRECTION C1	CORRECTION C2	CURVE ELEV.
10+050	50 m	N/A	12.500	-0.25 m	N/A	12.250
10+100	100 m	N/A	15.000	-1.00 m	N/A	14.000
10+150	N/A	150 m	16.000	N/A	-0.5625 m	15.438
10+200	N/A	100 m	17.000	N/A	-0.25 m	16.750
10+250	N/A	50 m	18.000	N/A	-0.0625 m	17.938
10+300	N/A	0 m	19.000	N/A	0 m	19.000

FORMULAS

Let L = total length of vertical curve
L1 = length of vertical curve back of PI
L2 = length of vertical curve ahead of PI
G1 = first grade of curve back of PI
G2 = second grade of curve ahead of PI
X1 = distance from PC of any point back of PI
X2 = distance from PT of any point ahead of PI
C1 = correction for any point back of PI
C2 = correction for any point ahead of PI
C = center correction at PI

Then $C=\frac{(L1)(L2)(G2-G1)}{2L}$

$$C1=\frac{(C)(X1)^2}{(L1)^2}$$

$$C2=\frac{(C)(X2)^2}{(L2)^2}$$

All dimensions in meters.
All grades in decimals.

290 m SSD, 120 km/h DES. SPEED			
GRADE A/2 %	Lc=209A (meters)	Ls= 38A (meters)	"H" (meters)
1.0	418	76 ⊗	1.425
1.5	627	114	3.206
2.0	836	152	5.700
2.5	1045	190	8.906
3.0	1254	228	12.825
3.5	1463	266	17.456
4.0	1672	304	22.800
4.5	1881	342	28.856
5.0	2090	380	35.625
5.5	2299	418	43.106
6.0	2508	456	51.300

250 m SSD, 110 km/h DES. SPEED			
GRADE A/2 %	Lc=155A (meters)	Ls= 32A (meters)	"H" (meters)
1.0	310	66 ⊗	1.105
1.5	465	96 ⊗	2.464
2.0	620	128	4.380
2.5	775	160	6.844
3.0	930	192	9.855
3.5	1085	224	13.414
4.0	1240	256	17.520
4.5	1395	288	22.174
5.0	1550	320	27.375
5.5	1705	352	33.124
6.0	1860	384	39.420

210 m SSD, 100 km/h DES. SPEED			
GRADE A/2 %	Lc=110A (meters)	Ls= 26A (meters)	"H" (meters)
1.0	220	60 ⊗	0.850
1.5	330	78 ⊗	1.823
2.0	440	104	3.240
2.5	550	130	5.063
3.0	660	156	7.290
3.5	770	182	9.923
4.0	880	208	12.960
4.5	990	234	16.403
5.0	1100	260	20.250
5.5	1210	286	24.503
6.0	1320	312	29.160

140 m SSD, 80 km/h DES. SPEED			
GRADE A/2 %	Lc= 49A (meters)	Ls= 16A (meters)	"H" (meters)
1.0	98 ⊗	48 ⊗	0.485
1.5	147	48 ⊗	0.911
2.0	196	64 ⊗	1.620
2.5	245	80 ⊗	2.531
3.0	294	96 ⊗	3.645
3.5	343	112	4.961
4.0	392	128	6.480
4.5	441	144	8.201
5.0	490	160	10.125
5.5	539	176	12.251
6.0	588	192	14.580

120 m SSD, 70 km/h DES. SPEED			
GRADE A/2 %	Lc= 36A (meters)	Ls= 14A (meters)	"H" (meters)
1.0	72 ⊗	42 ⊗	0.390
1.5	108	42 ⊗	0.720
2.0	144	56 ⊗	1.280
2.5	180	70 ⊗	2.000
3.0	216	84 ⊗	2.880
3.5	252	98 ⊗	3.920
4.0	288	112	5.120
4.5	324	126	6.480
5.0	360	140	8.000
5.5	396	154	9.680
6.0	432	168	11.520

110 m SSD, 65 km/h DES. SPEED			
GRADE A/2 %	Lc= 30A (meters)	Ls= 12A (meters)	"H" (meters)
1.0	60 ⊗	39 ⊗	0.345
1.5	90 ⊗	39 ⊗	0.630
2.0	120	48 ⊗	1.080
2.5	150	60 ⊗	1.688
3.0	180	72 ⊗	2.430
3.5	210	84 ⊗	3.308
4.0	240	96 ⊗	4.320
4.5	270	108	5.468
5.0	300	120	6.750
5.5	330	132	8.168
6.0	360	144	9.720

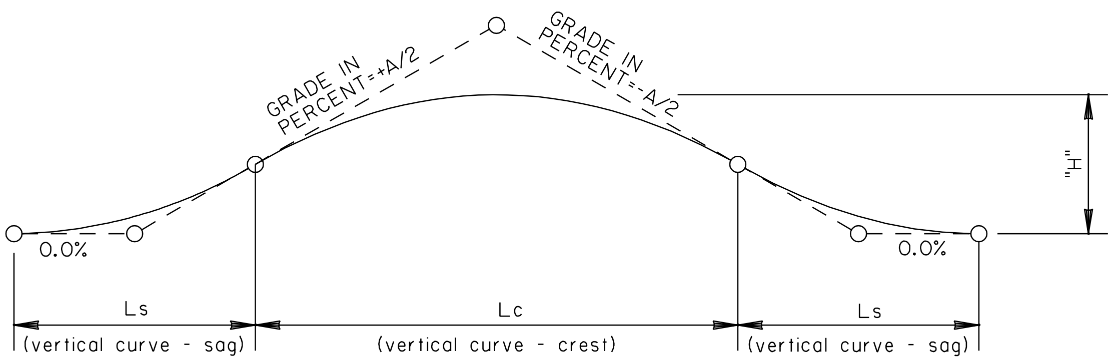
90 m SSD, 60 km/h DES. SPEED			
GRADE A/2 %	Lc= 20A (meters)	Ls= 10A (meters)	"H" (meters)
1.0	40 ⊗	36 ⊗	0.280
1.5	60 ⊗	36 ⊗	0.495
2.0	80 ⊗	40 ⊗	0.800
2.5	100	50 ⊗	1.250
3.0	120	60 ⊗	1.800
3.5	140	70 ⊗	2.450
4.0	160	80 ⊗	3.200
4.5	180	90 ⊗	4.050
5.0	200	100	5.000
5.5	220	110	6.050
6.0	240	120	7.200

70 m SSD, 50 km/h DES. SPEED			
GRADE A/2 %	Lc= 13A (meters)	Ls= 7A (meters)	"H" (meters)
1.0	30 ⊗	30 ⊗	0.225
1.5	39 ⊗	30 ⊗	0.371
2.0	52 ⊗	30 ⊗	0.560
2.5	65 ⊗	35 ⊗	0.844
3.0	78 ⊗	42 ⊗	1.215
3.5	91 ⊗	49 ⊗	1.654
4.0	104	56 ⊗	2.160
4.5	117	63 ⊗	2.734
5.0	130	70 ⊗	3.375
5.5	143	77 ⊗	4.084
6.0	156	84 ⊗	4.860

NOTES: THE MINIMUM LENGTH OF A VERTICAL CURVE = 0.6V, EXCEPT IN SPECIAL CASES SUCH AS IN RURAL SECTIONS WHERE THE MINIMUM LENGTH = 100 m.

"H" ON THE PLANS MUST NOT BE LESS THAN WHAT IS SHOWN ON THIS SHEET.

⊗ SEE NOTES ABOVE.



FORMULAS:

$$Lc = KAc = \frac{A(S)^2}{404}$$

$$Ls = KAs = \frac{0.5A(S)^2}{120+3.5S}$$

$$Lc(min) = Ls(min) = 0.6V$$

where S = SSD (in meters), and V is speed(in km/h).

VERTICAL CURVES

(DESIRABLE LENGTHS)

GRADE A/2 %	Lc=110A (meters)	Ls= 26A (meters)	"H" (meters)
210 m SSD, 120 km/h DES. SPEED			
1.0	220	72 ⊗	0.910
1.5	330	78 ⊗	1.823
2.0	440	104	3.240
2.5	550	130	5.063
3.0	660	156	7.290
3.5	770	182	9.923
4.0	880	208	12.960
4.5	990	234	16.403
5.0	1100	260	20.250
5.5	1210	286	24.503
6.0	1320	312	29.160

GRADE A/2 %	Lc= 81A (meters)	Ls= 22A (meters)	"H" (meters)
180 m SSD, 110 km/h DES. SPEED			
1.0	162	66 ⊗	0.735
1.5	243	66 ⊗	1.406
2.0	324	88 ⊗	2.500
2.5	405	110	3.906
3.0	486	132	5.625
3.5	567	154	7.656
4.0	648	176	10.000
4.5	729	198	12.656
5.0	810	220	15.625
5.5	891	242	18.906
6.0	972	264	22.500

GRADE A/2 %	Lc= 64A (meters)	Ls= 19A (meters)	"H" (meters)
160 m SSD, 100 km/h DES. SPEED			
1.0	128	60 ⊗	0.620
1.5	192	60 ⊗	1.170
2.0	256	76 ⊗	2.040
2.5	320	95 ⊗	3.188
3.0	384	114	4.590
3.5	448	133	6.248
4.0	512	152	8.160
4.5	576	171	10.328
5.0	640	190	12.750
5.5	704	209	15.428
6.0	768	228	18.360

GRADE A/2 %	Lc= 36A (meters)	Ls= 14A (meters)	"H" (meters)
120 m SSD, 80 km/h DES. SPEED			
1.0	72 ⊗	48 ⊗	0.420
1.5	108	48 ⊗	0.765
2.0	144	56 ⊗	1.280
2.5	180	70 ⊗	2.000
3.0	216	84 ⊗	2.880
3.5	252	98 ⊗	3.920
4.0	288	112	5.120
4.5	324	126	6.480
5.0	360	140	8.000
5.5	396	154	9.680
6.0	432	168	11.520

GRADE A/2 %	Lc= 25A (meters)	Ls= 11A (meters)	"H" (meters)
100 m SSD, 70 km/h DES. SPEED			
1.0	50 ⊗	42 ⊗	0.335
1.5	75 ⊗	42 ⊗	0.596
2.0	100	44 ⊗	0.940
2.5	125	55 ⊗	1.469
3.0	150	66 ⊗	2.115
3.5	175	77 ⊗	2.879
4.0	200	88 ⊗	3.760
4.5	225	99 ⊗	4.759
5.0	250	110	5.875
5.5	275	121	7.109
6.0	300	132	8.460

GRADE A/2 %	Lc= 20A (meters)	Ls= 10A (meters)	"H" (meters)
90 m SSD, 65 km/h DES. SPEED			
1.0	40 ⊗	39 ⊗	0.295
1.5	60 ⊗	39 ⊗	0.518
2.0	80 ⊗	40 ⊗	0.800
2.5	100	50 ⊗	1.250
3.0	120	60 ⊗	1.800
3.5	140	70 ⊗	2.450
4.0	160	80 ⊗	3.200
4.5	180	90 ⊗	4.050
5.0	200	100	5.000
5.5	220	110	6.050
6.0	240	120	7.200

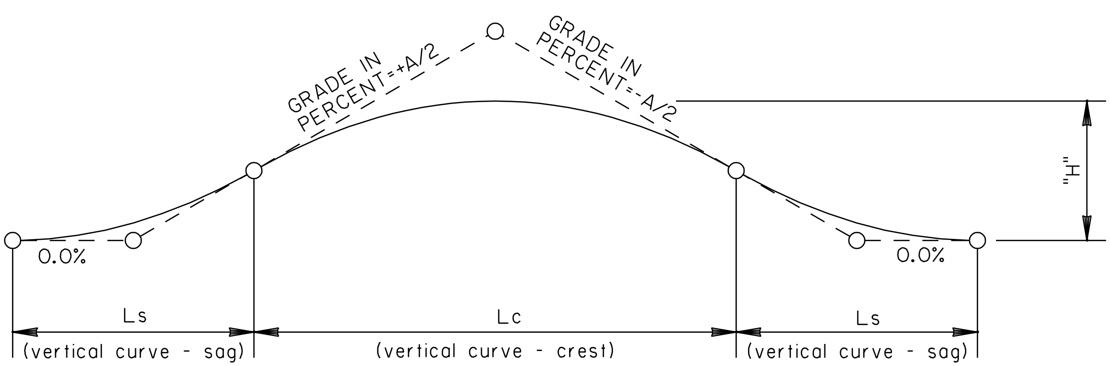
GRADE A/2 %	Lc= 16A (meters)	Ls= 8A (meters)	"H" (meters)
80 m SSD, 60 km/h DES. SPEED			
1.0	36 ⊗	36 ⊗	0.270
1.5	48 ⊗	36 ⊗	0.450
2.0	64 ⊗	36 ⊗	0.680
2.5	80 ⊗	40 ⊗	1.000
3.0	96 ⊗	48 ⊗	1.440
3.5	112	56 ⊗	1.960
4.0	128	64 ⊗	2.560
4.5	144	72 ⊗	3.240
5.0	160	80 ⊗	4.000
5.5	176	88 ⊗	4.840
6.0	192	96 ⊗	5.760

GRADE A/2 %	Lc= 9A (meters)	Ls= 6A (meters)	"H" (meters)
60 m SSD, 50 km/h DES. SPEED			
1.0	30 ⊗	30 ⊗	0.225
1.5	30 ⊗	30 ⊗	0.225
2.0	36 ⊗	30 ⊗	0.480
2.5	45 ⊗	30 ⊗	0.656
3.0	54 ⊗	36 ⊗	0.945
3.5	63 ⊗	42 ⊗	1.286
4.0	72 ⊗	48 ⊗	1.680
4.5	81 ⊗	54 ⊗	2.126
5.0	90 ⊗	60 ⊗	2.625
5.5	99 ⊗	66 ⊗	3.176
6.0	108	72 ⊗	3.780

NOTES: THE MINIMUM LENGTH OF A VERTICAL CURVE = 0.6V, EXCEPT IN SPECIAL CASES SUCH AS IN RURAL SECTIONS WHERE THE MINIMUM LENGTH = 100 m.

"H" ON THE PLANS MUST NOT BE LESS THAN WHAT IS SHOWN ON THIS SHEET.

⊗ SEE NOTES ABOVE.



FORMULAS:

$$Lc = KAc = \frac{A(S)^2}{404}$$

$$Ls = KAs = \frac{0.5A(S)^2}{120+3.5S}$$

$$Lc(min) = Ls(min) = 0.6V$$

where S = SSD (in meters), and V is speed (in km/h).

VERTICAL CURVES

(MINIMUM LENGTHS)

SIMPLE CURVE FORMULAS

Δ is angle of intersection of tangents or central angle.

R (radius) = $T / \tan(\Delta/2) = C / 2\sin(\Delta/2)$

$= E / \text{ex sec}(\Delta/2) = M / 1-\cos(\Delta/2)$

L (length of curve) = $0.017453293(R)(\Delta)$

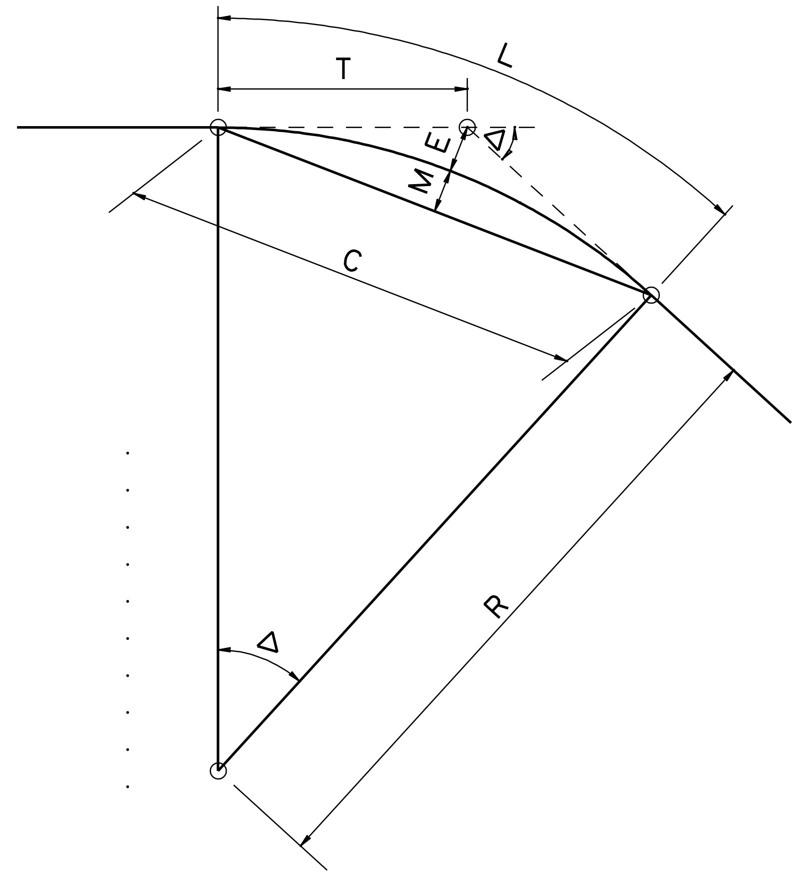
T (tangent) = $R \tan(\Delta/2) = C / 2\cos(\Delta/2) = E / \tan(\Delta/4)$

E (external) = $T \tan(\Delta/4) = R \text{ ex sec}(\Delta/2)$

M (middle ordinate) = $R - R\cos(\Delta/2) = E \cos(\Delta/2)$

$= 0.5C \tan(\Delta/4)$

C (chord) = $2R \sin(\Delta/2) = 2T \cos(\Delta/2)$



HORIZONTAL CURVES

STANDARD PLANS AND STANDARD DETAILS

Introduction

This section is intended to provide a list of available standard plans and standard details in order to prevent duplication of work. As these standard plans and standard details are continually being revised, it is the responsibility of the consultant or the in-house engineer to check with the project coordinator that the appropriate standard plans and standard details are included in the plans. Consultant manhours should not be included for details already covered on standard plans or standard details. All standard plans are listed on the title sheet along with its call number and latest revision date. Drawings for standard plans and standard details maintained by the Bridge Design Section are included in Appendix "A". All other standard plans (roadway, hydraulic, traffic control) may be obtained through the Department's General Files Section or the appropriate Department section.

Definitions

Standard plan: An independent design detail (or series of details) that is routinely incorporated into the construction plans without modification and has been designated by the Chief Engineer as a standard plan. Official Department standard plans are signed by the Chief Engineer and described by a call number on the drawing (i.e., GR-200 (M)).

Standard detail: Details maintained by the Bridge Design Section and are not signed by the Chief Engineer. These details are not official Department standards, and may require supplemental information for specific projects. These details are normally used on bridge related projects only.

Policy for Adoption, Revision and Distribution of Standard Plans

The Contracts and Specifications Engineer Administrator will be responsible for the administering of all Standard plans. Proposed additions, deletions, and revisions must be submitted to his office in order to obtain the approval of the Chief Engineer. See E.D.S.M. I.1.1.2 for further information.

Use of Standard Plans and Standard Details by entities other than DOTD

1. The Department will furnish a blue-line print of a Standard Plan or Detail stamped **"For Informational Purposes Only".**

2. The Department will furnish a reproducible copy of a Standard Plan or Detail if the requesting entity submits a formal, hold-harmless resolution, signed by someone with authority to accept responsibility. The letter for this request shall specify the project name and location for which the plans will be applied.

3. The reproducible will be furnished to the consultant working for the requesting entity on a project specific basis.

Standard Plans Maintained by the Bridge Design Section

Guardrail:

1. GR-200 (M), Guardrail For Bridge Ends, T-intersections

2. GR-201 (M), Guardrail For Median & Roadside Obstacles

3. GR-202 (M), Guardrail For Box Culvert

4. GR-203 (A) (M) and GR-203(B) (M), Guardrail For Off-System Bridges

Miscellaneous:

1. SWBS-100 (M), Steel Wire Bar Supports

2. RW-01 (M), Retaining Wall

Standard Details maintained by the Bridge Design Section

Concrete Slab Spans (Superstructure, Substructure and Approach Slabs)

1. 6 m and 20 ft. Cast-In-Place Slab Spans (On-System Bridges)

2. 6 m and 19 ft. Precast Slab Spans (Off-System Bridges)

Span and Girder Details:

1. Miscellaneous Span and Girder Details, Prestressed Girders
2. Optional Span Details Concrete, (precast panels)
3. Optional Span Details Steel, (precast panels)
4. Strip Seal Joint
5. GF-1, Open Steel Grid Floor
6. GF-2, Open Steel Grid Floor (Heavy Duty)
7. Bridge End Drain Details

Revetment:

1. CR-1 (M), Cast-In-Place Revetment
2. FR-01 (M), Flexible Revetment and Rip-Rap

Piling:

1. CS-216 (M), Precast-Prestressed Piling
2. Prestressed Cylinder Pile
3. Alternate Pile Splice, Dyna-A-Splice
4. Pile Splice, Cement Dowel
5. Concrete Pile Alternates

Approach Slab Drainage:

1. ASD-SS, Underdrains for Approach Slabs (Slab Spans)
2. ASD-SA, Underdrains for Approach Slabs (Girder Spans)

Barrier Railing:

1. BR-01 (M), Barrier Railing (Girder Spans)
2. BR-02 (M), Barrier Railing (Slab Spans)
3. BR-03 (M), Barrier Railing (Low Speed Urban Transition)
4. BR-04A (M), Barrier Railing (Precast Slab Spans, Bolted Barrier)
5. BR-04B (M), Barrier Railing (Precast Slab Spans, Cast w/Panel)
6. BR-05 (M), Barrier Railing Transition

Guardrail:

1. MELT, Guardrail End Treatment
2. New Jersey Bridge Rail Retrofit
3. Anchor Block Retrofit
4. Approach Guardrail & Bridge Rail Rehabilitation (Misc. Details)

Detours:

1. Bridge Detour (Precast Concrete Panel)
2. Bridge Detour Substructure (Acrow Panel)
3. Temporary Precast Barrier

Signing:

1. Permanent Signing (Overhead & Ground Mounted Signs)

Lighting:

1. High Mast Tower Details

Miscellaneous:

1. YP-01(M), year plates

Typically used Standard Plans maintained by other sections

1. SD-50,100,150,200 - 50 ft. to 200 ft. Spur Dike Details, (Hydraulics Section)

2. RS-31, Hazard Markers, (Road Design Section)

3. HS-01, Construction Signs and Barricades, (Traffic and Planning Section)

4. PM-01 (M), Raised Traffic Markers and Pavement Markings, (Traffic and Planning Section)

Other standard plans not listed may be obtained through the DOTD General Files Section. These include: roadway, hydraulic and traffic standard plans.